REMARKS

In the Office Action the Examiner noted that claims 1-22 were pending in the application and the Examiner rejected all claims. By this Amendment various claims have been amended and new claim 23 has been added. Thus, claims 1-23 remain pending in the application. The Examiner's rejections are traversed below.

Claim Objection

In item 2 on page 2 of the Office Action the Examiner objected to claim 22 on the basis that its dependency was incorrect. Claim 22 has been amended in the manner indicated by the Examiner.

Rejection Under 35 U.S.C. § 103

In item 3 on pages 2-6 of the Office Action the Examiner has rejected claims 1-22 under 35 U.S.C. § 103 as unpatentable over U.S. Patent 5,668,631 to Norita et al. in view of the IEEE Standard Dictionary of Electrical and Electronics Terms.

The Prior Art

U.S. Patent 5,668,631 to Norita et al. is directed to a measuring system with an improved method of reading image data of an object. In particular, Norita discloses a three dimensional shaped measuring apparatus in which slit beams of light are radiated on a subject to perform an image pick up by a CCD to detect three dimensional data. For example, Figure 1 illustrates a light projecting optical system 2 for irradiating an object 1 with a laser beam which is output from a semiconductor laser 5 and turned into a slit shaped light. A light receiving optical system 3 (Figure 2) guides the projected laser beam to imaging centers 24 and 12. The optical systems 2 and 3 are arranged on a same rotary frame 4 (column 6, lines 1-9).

In rejecting claim 1, the Examiner relied upon a number of drawing figures such as Figures 35-37, 41 and 58-63. Figures 58-63 are described starting at column 38, line 65. For example, Figure 58 discloses a galvano scanner used to project light onto a sheet of paper.

The Present Claimed Invention Patentably Distinguishes Over the Prior Art

In the Office Action the Examiner takes the position that Norita et al. is a "real life" measuring system which teaches all of the features of claim 1 except for the features of a "simulation CAD system." However, the Examiner takes the position that this feature is taught by the definition of a simulator on page 995 of the IEEE Dictionary. The Examiner further takes the following position concerning obviousness:

> "It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Norita with those of IEEE Dictionary because 'a simulator is a device used to interact with, or to train, a human operator in the performance of a given task or tasks.'"

It is submitted that the claims, as amended, patentably distinguish over the prior art because certain features of the claims are not taught by the prior art, and the Examiner's line of reasoning for combining a dictionary definition with the Norita reference, is deficient.

Claim 1

Referring to claim 1, it is submitted that none of the prior art teaches or suggests an optical model creating unit creating and allowing a display of a three dimensional optical model, and an optical axis auto-creation unit figuring out, based on predetermined set parameters, a cylindrical optical axis model having a predetermined optical axis diameter and length. Specifically, referring to claim 1, it is submitted that none of the prior art teaches or suggests an optical path simulation CAD system which includes:

> "an optical model creation unit creating and allowing a display of a three-dimensional optical model in which one or more optical components are disposed on an optical path extending from a light source to a final arrival position; and
>
> an optical axis auto-creation unit figuring out, based on predetermined set parameters, a cylindrical optical axis model having a predetermined optical axis diameter and length indicative of behaviors of beams of light in said three-dimensional optical

model, said optical axis auto-creation unit arranging and displaying said axis model in said three-dimensional optical model, for verification."

It is submitted that the above features are not taught or suggested by the measuring apparatus of Norita et al., nor are they taught by the definition in the IEEE Dictionary. Further, as explained in the specification, the present claimed invention provides significant advantages by ensuring an appropriate design and verification by three-dimensionally representing on a screen the behaviors of beams of light most approximate to the real-time object by use of a pseudo-three-dimensional optical model in lieu of trial manufacturing. Therefore, it is submitted that claim 1 patentably distinguishes over the prior art.

It is also submitted that the Examiner's line of reasoning for combining the dictionary definition with Norita is deficient. It is submitted that in order to provide an appropriate line of reasoning for combining the teachings and the prior art, it is necessary that the line of reasoning for combining the teachings come from the prior art and not from the applicant's specification. It is submitted that the Examiner's line of reasoning is clearly based on hindsight as the dictionary definition provides no motivation which would suggest to one of ordinary skill that the measuring apparatus of Norita et al. should be turned into an optical path simulation CAD system. Thus, for this reason also, it is submitted that claim 1 patentably distinguishes over the prior art.

Claim 2

Referring to claim 2, it is submitted that the prior art does not teach or suggest defining the optical axis model in the following manner:

"said optical axis auto-creation unit defines for said optical axis model, the optical axis diameter and the color of a beam of light emitted from said light source, and optical axis auto-creation unit creating and arranging as said optical axis model, a cylindrical shape having a length starting from said light source and ending in an input surface of a next adjacent optical component lying on said optical path."

Therefore it is submitted that claim 2 patentably distinguishes over the prior art.

Claim 3

Referring to claim 3, it is submitted that the prior art does not teach or suggest:

"said optical axis auto-creation unit varies the optical axis diameter of said optical axis model as a function of the distance from the starting point."

For example, this claim is directed to a case where the optical axis diameter is reduced inversely proportional to the length. These features are not taught or suggested by the prior art. Therefore, it is submitted that claim 3 patentably distinguishes over the prior art.

Claim 4

Referring to claim 4 it is submitted that the prior art does not teach or suggest:

"for said optical component(s) interposed between said light source and a final arrival position, said optical axis auto-creation unit creates output-side optical axis model(s) in conformity with optical functions of said optical component(s) from input optical axis model(s), to arrange said output-side optical axis model between said optical component and a next adjacent optical component or said final arrival position."

Therefore, it is submitted that claim 4 patentably distinguishes over the prior art.

Claim 5

Referring to claim 5, this claim is directed to a situation in which the optical component lying on the optical path is a movable reflecting mirror in which:

"in case said optical component lying on said optical path is a movable reflecting mirror that is capable of swinging around a predetermined rotational axis, said optical axis auto-creation unit is able to designate as control parameters the position of said rotational axis and the angle of a reflection surface within a three-dimensional space, said optical axis auto-creation unit automatically creating and arranging reflected optical axis models

from input optical axis models on the basis of said control parameters."

Therefore, it is submitted that claim 5 patentably distinguishes over the prior art.

Claim 6

Referring to claim 6, this claim is directed to the situation in which the optical component lying on the optical path is a polygon mirror in which:

"in case said optical component lying on said optical path is a polygon mirror that has a plurality of mirror faces formed on its periphery and that rotates at a certain angular velocity, said optical axis auto-creation unit previously defines the structures of said plurality of mirror faces within a three-dimensional space and the angles of the reflection surfaces from mirror rotational angles, and automatically creates and arranges an optical axis model reflected on a specific mirror face from an input optical axis model."

Therefore, it is submitted that claim 6 patentably distinguishes over the prior art.

Claim 7

Referring to claim 7, this claim is directed to the situation in which the optical component lying on the optical path is a lens in which:

"in case said optical component lying on said optical path is a lens, said optical axis auto-creation unit previously defines optical functions of said lens and automatically creates an output-side optical axis model in conformity with said optical functions from an input optical axis mode, to arrange said output-side optical axis model between said optical component and a next adjacent optical component or an image forming face."

Therefore, it is submitted that claim 7 patentably distinguishes over the prior art.

Claim 8

Claim 8 recites that:

"said optical axis auto-creation unit provides a display of an optical axis ending point at a position where an optical axis model intersects said final arrival face, said optical axis auto-creation unit recording coordinates of said ending point into a file."

Therefore, it is submitted that claim 8 patentably distinguishes over the prior art

Claim 9

Claim 9 recites that:

"said optical axis auto-creation unit defines a boundary wall model indicative of an optical axis extension limit around said three-dimensional optical model, said optical axis auto-creation unit if said optical path has no final arrival position providing an ending point, setting the position of said boundary wall model which said optical axis model intersects as an ending point of an extended optical axis model."

Therefore, it is submitted that claim 9 patentably distinguishes over the prior art.

Claims 10 and 11

Claims 10 and 11 depend from claim 1, directly or indirectly, and include all of the features of claim1, plus additional features which are not taught or suggested by the prior art. Thus, it is submitted that claims 10 and 11 patentably distinguish over the prior art.

Claim 12

Independent claim 12 is directed to an optical path simulation method which includes:

"creating and displaying a three-dimensional optical model in which one or more optical components are disposed on an optical

path extending from a light source to a final arrival position; and

calculating based on predetermined set parameters a cylindrical optical axis model having a predetermined optical axis parameter and length indicative of behaviors of beams of light in said three-dimensional optical model , to arrange and provide a display of said optical axis model in said three-dimensional optical model, for verification."

Therefore, it is submitted that claim 12 patentably distinguishes over the prior art.

Claims 13-22

Claims13-22 depend directly or indirectly from claim 12 and include all of the features of that claim plus additional features which distinguish over the prior art in a manner analogous to dependent claims 2-11. Therefore, it is submitted that claims 13-22 also patentably distinguish over the prior art.

Claim 23

New Claim 23 is directed to an optical path simulation method which includes:

creating a three-dimensional optical model in which at least one optical component is disposed on an optical path between a light source and a destination position; and

calculating a cylindrical optical axis model having a predetermined optical axis parameter and length indicative of behaviors of beams of light in the three-dimensional optical model; and

displaying the optical axis model in the three-dimensional optical model, for verification.

Therefore, it is submitted that claim 23 patentably distinguishes over the prior art.

Summary

It is submitted that none of the references, either taken alone or in combination, teach the present claimed invention. Thus, claims 1-23 are deemed to be in a condition suitable for allowance. Reconsideration of the claims and an early notice of allowance are earnestly solicited.

Respectfully submitted,

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